

LINUX IS GROWING

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ABSTRACT: The article "Linux is Growing" deals with the recent booming growth of the Operating System and justifies its edge over Windows Operating System.

KEYWORDS: Linux, FOSS, Open Source

1. History

In order to understand the history of Linux, one has to time travel 30 years back. Computer sizes were enormous; ranging from houses to stadiums. While the sizes of those computers posed substantial problems, there was one thing that made this even worse; every computer had a different operating system. Software was always customized to serve a specific purpose, and software for one given system didn't run on another system. Being able to work with one system didn't automatically mean that you could work with another. It was difficult, both for the users and the system administrators.

Computers were extremely expensive then, and sacrifices had to be made even after the original purchase just to get the users to understand how they worked. The total cost per unit of computing power was enormous.

Technologically the world was not quite that advanced, so they had to live with the size for another decade. In 1969, a team of developers in the Bell Laboratories (along with GE and MIT) started working on a solution for the software problem, to address these compatibility issues. They developed a new operating system, which was

1. Simple and elegant.
2. Provide computation power.
3. Store data.
4. Able to share data among multiple users.
5. Able to recycle data.

The Bell Labs developers named their OS MULTICS- Multiplexed Information & Computer Service. The code recycling features were very important. Until then, all commercially available computer systems were written in a code specifically developed for one system [1-2].

The same year AT&T Bell Labs withdrew from the project. Dennis Ritchie and Ken Thompson continued their project on building a new OS which was computationally smarter. At the same time, Ken Thompson wrote a game, "space travel", in FORTRAN to run on GECOS OS (Honeywell 635). The spaceship was hard to control and it was expensive to run. Dennis Ritchie wrote the Language 'B' and then developed 'C' a compiled language. By 1973, the complete OS was written in C.

MULTICS which was then called as UNICS (later UNIX) as a pun of MULTICS had striking new features. UNIX had only a small piece of that special code, which is now commonly named the kernel. This kernel is the only piece of code that needs to be adapted for every specific system and forms the base of the UNIX system. The operating system and all other functions were built around this kernel and written in a higher programming language, C (which was especially developed for creating the UNIX system). Using this new technique, it was much easier to develop an operating system that could run on many different types of hardware.

The software vendors were quick to adapt, since they could sell ten times more software almost effortlessly. Weird new situations came in existence: say for instance computers from different vendors communicating in the same network, or users working on different systems without the need for extra education to use another computer. UNIX did a great deal to help users become compatible with different systems.

Throughout the next couple of decades the development of UNIX continued. UNIX got globalized and more things became possible to do as more hardware and software vendors added support for UNIX to their products.

Linux is Growing

2. The Four Freedoms

By the beginning of the 1990s, home PCs were finally powerful enough to run a full blown UNIX. Linus Torvalds, a young man studying computer science at the University of Helsinki, thought it would be a good idea to have some sort of freely available academic version of UNIX, and promptly started to code.

Linus started to ask questions, looking for answers and solutions that would help him get UNIX on his PC. Below is one of his first posts in comp.os.minix, dating back to 1991 [2]:

**“From: torvalds@klaava.Helsinki.FI (Linus Benedict Torvalds)
Newsgroups: comp.os.minix
Subject: Gcc-1.40 and a posix-question
Message-ID: <1991Jul3.100050.9886@klaava.Helsinki.FI>
Date: 3 Jul 91 10:00:50 GMT
Hello netlanders,
Due to a project I'm working on (in minix), I'm interested in the posix standard definition. Could somebody please point me to a (preferably) Machine-readable format of the latest posix rules? Ftp-sites would be nice.”**

From the start, it was Linus' goal to have a free system that was completely compliant with the original UNIX. That is why Linus asked for POSIX standards, POSIX still being the standard for UNIX.

In those days plug-and-play wasn't invented yet, but so many people were interested in having a UNIX system of their own, that this was only a small obstacle. New drivers became available for all kinds of new hardware, at a continuously rising speed. Almost as soon as a new piece of hardware became available, someone bought it and submitted it to the Linux test, as the system was gradually being called, releasing more free code for an ever wider range of hardware. These coders didn't stop at their PC's; every piece of hardware they could find was useful for Linux.

Back then, those people were called “nerds” or “freaks”, but it didn't matter to them, as long as the supported hardware list grew longer and longer. Thanks to these people, Linux is now not only ideal to run on new PC's, but is also the system of choice for old and exotic hardware that would be useless if Linux didn't exist.

Two years after Linus' post, there were 12000 Linux users and it is still growing today. Meanwhile Richard Matthew Stallman (called RMS as a nick), a hacker from MIT was fighting for the cause of open source software. Stallman being a hacker understood the freedoms taken away from him as the US Government imposed a Software Copyright Act of 1976.

RMS started a GNU project in 1983. The foundation developed Free and Open Source Software (FOSS) which retained all the freedoms. It could be changed, modified and redistributed on will with free Licensing.

As Linus came with the Linux Kernel people started mixing up the two. Thus came to life the GNU/Linux, which one uses today (abbreviated as Linux).

The main reasons behind Linux growth are the four freedoms.

- The freedom to run the program, for any purpose.
- The freedom to study how the program works, and adapt it to one's needs.
- The freedom to redistribute copies so that one can help his/her neighbour.
- The freedom to improve the program, and release one's improvements to the public, so that the whole community benefits.

Even today every Mega MLC remotely related to computer science runs its system on a LINUX (Except Microsoft-*it has its own issues*).

Few people would debate that Linux is a reliable, secure operating system. In addition to being cost-effective, it is constantly being updated and refined with the latest technologies. As Linux gains greater acceptance throughout the computing industry, more and more companies are supporting Linux via both application and hardware compatibility.

3. Comparing Linux to Windows

The best way of highlighting the benefits of Linux and UNIX is to compare them to what many people are using today - any of the various flavours of Microsoft Windows [1,3].

3.1. Linux is reliable

The Blue Screen of Death doesn't exist in the Linux world. Linux systems, just like UNIX and NetWare, can run for years without failure. Operating system crashes (called “kernel panics” in Linux) are rare - many Linux users have never seen a crash.

3.2. Linux runs on one's existing machines

The efficiency of Linux and most Linux/Unix applications allows users to use nearly any computer. A typical web server or file server can be a low-end pentium class PC. Many graphical applications run with acceptable performance on 150 MHz Pentium class machines. Linux/Unix Office suites that try to be replacements for Microsoft Office need faster computers but not as fast as what's needed for Windows. Users don't need to plan on new PC purchases every few years. Machine requirements change very little with each successive version of Linux. Rather than spending money on new computers every few years, users can put the money in the employee profit share plan.

3.3. Linux: free requiring no costly add-ons

Users can download Linux from the Internet and install it on as many machines as they like. The same is true of most application software. Users may find it more convenient to purchase a CD-ROM of a Linux "distribution". Email and newsgroup servers, remote administration tools, C/C++ compilers, high-end graphics programs, SQL servers (all costly add-ons for Windows) are included at no charge with Linux distributions.

3.4. Providing support

Linux is the best supported operating system of all time. The reason is the Internet. Help can be got from tens of thousands of enthusiastic Linux users and programmers. Support is free - the answers users get come from people who are not paid to help them. Users will hear about solutions to their problems that include dumping what they have and replacing it with something better - advice that they don't hear from vendors of commercial software.

3.5. Linux: no registry

When Microsoft introduced the Registry in Windows 95, it was applauded as being a mechanism that brought order to the chaos of the Windows 3.X "ini" files. At the time, people had no idea that the Registry would be such a handicap and get in the way of effectively managing networks of Windows machines. The Registry makes managing a Windows machine complex and difficult and is known to be responsible for some

reliability problems. In retrospect, the "ini" files were not so bad now that one has tasted the Registry. Linux is managed by simple, plain text, well documented, easy to troubleshoot, configuration files.

3.6. Linux: no need to restart

Some Windows configuration changes require a reboot. Reconfigure a Windows file server during the day may impact everyone. This limits system maintenance to off hours or impacts productivity. Nearly all Linux configuration changes can be done with the system running, without affecting unrelated services and without having to reboot. Reconfigure a Linux server and users may not notice.

3.7. Linux: no SIDs needed

Cloning Windows systems is made more difficult by the SID (system identifier) that must be unique between machines. With Windows XP and its hardware-based licensing scheme, cloning systems becomes not only very difficult but illegal - according to Microsoft's licensing terms. Linux has no need for system identifiers. Each Linux machine is distinguished by its name and IP address. Both of these are easily modified and require no rebooting. Cloning Linux systems is dead simple.

3.8. No licensing mechanism for Linux

Upgrading Windows software is more difficult than it should be because of licensing. The licensing schemes vary but the result is that one has to jump through hoops to install or upgrade software. Linux and its system programs have no license-enforcement mechanism and thus no hoops.

3.9. Privacy issues

Every few months or so, it seems that there is yet another report of a Microsoft product that behaves in a way that raises concerns about the privacy. One does not have these concerns when one uses Linux and Open Source software, because functions that would violate the privacy would be detected when the code is scrutinized by an army of Linux enthusiasts.

3.10. The GUI: optional

Windows carries its resource-intensive GUI baggage around at all times. Yet, some systems, such as web

Linux is Growing

servers and file servers, do not need a GUI and don't benefit by it. The Linux GUI (X Window) is an optional subsystem that can be chosen to use or not. Additionally, one can start and stop the GUI anytime. He/she likes without restarting the system or impacting any programs already running.

3.11. Disk defragmentation

All versions of Windows suffer from the same problem - disk fragmentation significantly reduces performance. Even Microsoft's latest new versions of Windows use a file system that has fragmentation problems just like the early-1980s vintage DOS. A Windows file server must be *defragged* frequently. The native Linux file system is designed to fragment very little and defragmentation programs are unnecessary.

3.12. Security

By default, users cannot install applications unless they change their permission or login as a supervisor. This ensures that any virus or malicious code cannot go and write to their application folder. By default, most Linux distributions have all their incoming ports blocked, thereby making their Operating more secure from network attacks. Windows have its shared file in a TCP/IP connection through ports 137 and 139.

3.13. File system and processor scalability

While NTFS file system can scale up to 16TB, XFS on Linux can scale up to 18million TB. Linux can scale to unlimited processors. It is already running on a single system with 2048 CPUs. Windows can't even claim to come anywhere near that number.

3.14. No hidden APIs

Windows has many hidden or undocumented APIs which is used for unfair advantage to Microsoft. In Linux, all APIs are completely open and well documented. For example, Microsoft specifies that everyone writing Internet application should use the Winsock API while Microsoft Internet Explorer doesn't use the Winsock

API, it uses an undocumented API allowing Internet Explorer to run faster than other browsers. Imagine!

3.15. Linux: a supercomputer OS

Out of Top 500 supercomputers, 85% of their OS is Linux-based. Windows has only 0.2% compared to Linux [4].

4. Conclusion

The future is open. The most widely used mp3/video player (VLC) to the most widely used Web Browser (Mozilla), all are open source. Software giant Google has all its API's open. PHP, MySQL, PERL, Python all the world's most popular scripting languages are open (documented).

GNU Linux Operating System adds to the cause "The future is Open". New releases of Gnome 3 provides the "touchy feely" and "user-friendliness" of other proprietary softwares into the Linux Domain.

Android the Linux-based operating system of mobiles grew from nothing to 38.9% of share in the mobile market since its release on 20th September 2008. More than 470 mobile devices work on Android platform [5]. Supercomputers today run mostly on Linux Operating System. Supercomputers of today will shape the computers of the future and so will Linux.

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